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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/712,775	11/14/2003	Donggyun Han	2557-000216/US	7409
30593 7590 08/24/2007 HARNES, DICKEY & PIERCE, P.L.C. P.O. BOX 8910 RESTON, VA 20195			EXAMINER ALANKO, ANITA KAREN	
			ART UNIT 1765	PAPER NUMBER
			MAIL DATE 08/24/2007	DELIVERY MODE PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary

Application No.

10/712,775

Applicant(s)

HAN ET AL.

Examiner

Anita K. Alanko

Art Unit

1765

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 24 May 2007.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-30 and 51-61 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) 19-30 and 57-60 is/are allowed.
- 6) ☒ Claim(s) 1-18, 51-56 and 61 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

Oath/Declaration

The declaration, filed June 14, 2004, lists Changki Hong twice as the inventor (with two different residences). Please confirm that this is correct, since Chang Ki Hong appears in the foreign priority document once. Hyo San Lee is listed as inventor in the priority document, but not in the present application.

Specification

The specification is objected to as failing to provide proper antecedent basis for the claimed subject matter. See 37 CFR 1.75(d)(1) and MPEP § 608.01(o). Correction of the following is required: explicit basis for the newly added negative limitation “a second reactant not containing the supercritical first reactant” in claims 1 and 61 is not present in the specification.

Claim Objections

Claims 51, 53, 55-56 are objected to under 37 CFR 1.75(c), as being of improper dependent form for failing to further limit the subject matter of a previous claim. Applicant is required to cancel the claim(s), or amend the claim(s) to place the claim(s) in proper dependent form, or rewrite the claim(s) in independent form. Claims 51, 53, 55-56 fail to further limit the claims from which they depend because they cite the term “then” which is already encompassed by the base claim terminology of “subsequently.” The claims may be merely cancelled.

Claim Rejections - 35 USC § 112

The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

Claims 1-5, 11-15, 51 and 61 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention. The newly added negative limitation “a second reactant not containing the supercritical first reactant” in claims 1 and 61 is new matter.

The specification provides for only gaseous ozone-based reactants as the second reactant, and does not positively recite that other reactants, such as the supercritical first reactant, are possible. Therefore, the limitation to exclude the supercritical first reactant is new matter. See MPEP 2173.05(i)¹

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claims 1-5, 11-15, 51 and 61 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

¹ Any negative limitation or exclusionary proviso must have basis in the original disclosure. If alternative elements are positively recited in the specification, they may be explicitly excluded in the claims. See *In re Johnson*, 558 F.2d 1008, 1019, 194 USPQ 187, 196 (CCPA 1977) (“[the] specification, having described the whole, necessarily described the part remaining.”).

The newly added negative limitation “a second reactant not containing the supercritical first reactant” in claims 1 and 61 fails to distinctly claim the subject matter which the applicant regards as his invention. Applicant is attempting to claim the invention by excluding what applicants did not invent rather than by particularly and distinctly pointing out what they did invent. *In re Schechter*, 205 F.2d 185, 98 USPQ 144 (CCPA 1953).

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

Claims 1-2, 4, 6-8, 11-16, 51-56 are rejected under 35 U.S.C. 102(e) as being anticipated by Mullee (US 6,306,564) as evidenced by Chandra et al (US 2002/0014257 A1) or WO 02/11191 A2.

Mullee discloses a method comprising:

sequentially treating the photoresist with a first reactant (supercritical carbon dioxide, col.4, lines 37-39) to cause swelling, cracking or delamination of the photoresist (since it is the same reactant as in the instant invention, the same results such as swelling are expected as evidenced by Chandra ([0078]) or WO 02/11191 A2 (page 26, line 1));

subsequently (since the second step is after the first step, and, for example, for a different time period col.4, lines 58-60) treating the photoresist with a second reactant (ozone, col.4, line

15) not containing the supercritical first reactant (since ozone does not contain carbon dioxide) to chemically alter the photoresist (since it is the same reactant as in the instant invention, the same results such as chemically altering are expected, as evidenced by WO 02/11191 A2 (see page 26, lines 1-3)), (col.4, lines 58-60, e.g. the two removal steps (col.4, lines 67-col.5, line 1) encompass sequential treating steps); and

subsequently removing the chemically altered photoresist with a third reactant (deionized water, col.5, lines 17-23).

However, Mullee inherently has treating with a first reactant, to cause swelling. Thereafter, the swelling allows for the subsequent, second treatment to be successful, i.e., for chemically treating or oxidizing (as evidenced by WO 02/11191 A2 at page 26, lines 1-3).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later

invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

Claim 3 is rejected under 35 U.S.C. 103(a) as being unpatentable over Mullee (US 6,770,426) in view of Vaartstra (US 6,770,426), Liu and Shibata.

The discussion of Mullee from above is repeated here.

As to claim 3, Mullee does not disclose ion implantation. However, Mullee discloses that the photoresist to be removed includes that used for the manufacture of semiconductor devices. Vaarstra teaches that ion-implanted resists are commonly formed during the manufacture of semiconductor devices (col.6, line 56). Liu and Shibata teach that ion implantation at the cited dosages are useful to enable the usage of thinner photoresists, which is useful for forming interconnections (see abstracts). It would have been obvious to use the cited dosage in the method of Mullee because Vaarstra teaches that resist to be removed includes ion-implanted resist and Liu and Shibata teach that the dosages cited are useful to enable the usage of thinner photoresists, which is useful for forming interconnections.

Claims 5 and 17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Mullee (US 6,770,426) in view of Vaartstra (US 6,770,426).

The discussion of Mullee from above is repeated here.

As to claims 5 and 17, Mullee discloses a pressure range of 2000-6000 psi that encompasses the cited pressure range (col.3, line 62 - col.4, line 3), however Mullee discloses a temperature of up to 80 °C (col.4, line 2), which is lower than the cited range of 100-150 °C.

Vaartstra teaches that a useful temperature range for using supercritical gases to remove photoresist includes 30 – 250 °C (col.7, line 58), which encompasses the cited range of 100-150 °C. It would have been obvious to one with ordinary skill in the art to operate at the cited temperature range in the method of Mullee because Vaartstra teaches that this is a useful temperature range for using supercritical gases to remove ion-implanted photoresist.

Claims 9-10 and 18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Mullee (US 6,770,426).

The discussion of Mullee from above is repeated here.

As to claims 9-10 and 18, Mullee does not disclose the parameters of the ozone, however temperature, pressure and concentration are all variables that effect how quickly ozone can chemically react. Thus, it would have been obvious to one with ordinary skill to operate at the cited parameters in the method of Mullee in order to get a process that works to effectively remove photoresist, or because they appear to reflect result-effective variables which can be optimized. See MPEP 2144.05 IIB.

Allowable Subject Matter

Claims 19-30, 57-60 are allowed.

Response to Amendment

The specification is objected to as failing to provide proper antecedent basis for the claimed subject matter. Claims 1-5, 11-15, 51 and 61 are rejected under 35 U.S.C. 112, first

paragraph, as failing to comply with the written description requirement. Claims 1-5, 11-15, 51 and 61 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claims 1-18, 51-56 remain rejected over Mullee. The rejection of claim 19 and its dependent claims 20-30, 57-61 over Mullee is withdrawn because Mullee does not suggest the newly added limitations of “depressurizing the chamber after the maintaining of contact between the substrate and the supercritical first reactant, and injecting a second reactant into the depressurized chamber,” as in the context of claim 19. Mullee introduces the second reactant, ozone, into the supercritical stream, not into a depressurized chamber after having maintained contact between the substrate and the supercritical first reactant.

Response to Arguments

Applicant's arguments filed May 24, 2007 have been fully considered but they are not persuasive.

As to amended claim language, applicant argues that Mullee does not disclose that the second reactant does not contain the supercritical first reactant. This argument is not commensurate in scope with the claim language. The claims have open “comprising” language, and since Mullee discloses that the second reactant is ozone, this encompasses a second reactant that does not contain supercritical first reactant. This argument would overcome the prior art rejection if the claim cited processing with a second reactant consisting of a second chemical that does not contain the supercritical first reactant.

The specification is objected to, and the claims rejected under 35 USC 112, first and second paragraphs. This objection and rejections would be withdrawn by claiming what the invention is, i.e., a second reactant consisting of ozone.

Conclusion

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. The cited art shows methods of processing with supercritical carbon dioxide.

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a).

Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Anita K. Alanko whose telephone number is 571-272-1458. The examiner can normally be reached on Mon-Fri until 2:30 pm (Wed until 11:30).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nadine Norton can be reached on 571-272-1465. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

/Anita K Alanko/
Primary Examiner
Art Unit 1765